

**Water Quality Implementation Plan for  
Greenvale, Paynes and Beach Creeks  
(Shellfish Areas Listed Due to Bacterial Contamination)**



**Prepared by:  
Virginia Department of Conservation and Recreation  
in cooperation with the Stakeholders of  
Greenvale, Paynes and Beach Creeks**

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## **ACKNOWLEDGMENTS**

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Virginia Department of Conservation and Recreation (DCR)  
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Northern Neck Planning District Commission  
Friends of Lancaster County

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This booklet is an abbreviated version of the technical report, which can be obtained by contacting the Virginia Department of Conservation and Recreation (DCR). Agency contact information can be found on the back of this booklet.

## **EXECUTIVE SUMMARY**

Greenvale and Beach Creeks, located in the southwestern section of Lancaster County, Virginia, were listed as impaired on Virginia's 1998 303(d) Total Maximum Daily Load Priority List and Report, and Paynes Creek was added to the list in 2008 due to violations of the State's water quality standards for fecal coliform. The creeks do not support Virginia's bacteria standards for the production of edible and marketable shellfish. The applicable fecal coliform bacteria standard specifies that the 90th percentile fecal coliform value for a sampling station not exceed an MPN (most probable number) of 49 per 100 milliliters. For every impaired water body on the 303(d) List, the Clean Water Act and the U.S. Environmental Protection Agency (EPA) both require that states develop a Total Maximum Daily Load (TMDL) for each pollutant (40 CFR Part 130). A TMDL study was completed for Greenvale and Beach Creeks by the Virginia Department of Environmental Quality (DEQ) in 2006 which established the reduction in loads needed to restore these waters.

Virginia law requires that a plan be developed to achieve fully supporting status for impaired waters. In fulfilling the state's requirement for the development of a TMDL Implementation Plan (IP), it was determined that based on the geographic proximity and watershed similarities that existed with Paynes Creek, that it would be included in the same implementation planning process.



### **Review of TMDL Development**

DEQ used a simplified Tidal Volumetric Model along with bacterial source tracking to aid in identifying sources (i.e., human, livestock, pet and wildlife) of fecal contamination in the development of this TMDL. The TMDLs for Greenvale and Beach Creeks are

based on the 30-sample 90<sup>th</sup> percentile concentration, which was determined to represent the critical condition. The TMDL allocations require bacterial load reductions of 81% for Greenvale Creek and 14% for Beach Creek.

### **Public Participation**

Public meetings were held to inform the public regarding the end goals and status of the IP process as well as to provide a means for soliciting participation in the smaller, more-targeted meetings (*i.e.*, working groups). Working groups were assembled from communities of people with common concerns regarding the TMDL process and were the primary arena for seeking public input. The working groups formed were Residential/Recreational, Business (Agriculture, Watermen, Marinas) and Government. Representatives from each working group participated in the Steering Committee, where input from the working groups was reviewed and decisions about the IP were made. Throughout the public participation process, major emphasis was placed on discussing best management practices (BMPs), BMP specifications, locations of control measures, education programs, technical assistance, and funding.

Varied opinions were voiced throughout the public participation meetings regarding the IP process. Most members of the working groups agreed that a cornerstone of the implementation plan is cultivating public involvement and education and encouraging commitment and partnerships between the citizens in the watershed and government agencies in order to reduce fecal bacteria pollution. Some members stressed that volunteerism is not likely to be successful and regulatory measures will be necessary.

### **Assessment of Implementation Action Needs**

Field surveys in the watershed and analysis of aerial imagery were used along with the stakeholder workgroup process and the TMDL study to conduct a bacteria source reassessment and evaluate alternative BMPs and strategies to reduce the bacteria loads reaching the creeks. The various practices were discussed by the workgroups regarding the costs, effectiveness, and appropriateness for the specific circumstances in the watersheds. Overall, the implementation needs for the five-year Phase 1 implementation period were identified and are shown in Table ES.1.

Cost estimates of the agricultural, residential, and other BMPs in this plan were calculated by multiplying the unit cost by the number of BMP units in each watershed. The unit cost estimates for the agricultural BMPs were derived from the Department of Conservation and Recreation's Agricultural Cost-Share Database. Average costs for BMP installations in Lancaster County were used where sufficient data existed, otherwise, Northern Neck average costs were used. The unit costs for residential practices were developed through discussions with the local health department, the TMDL IP workgroups and estimates from previous TMDL implementation plans. Estimates for education programs were based on target audience size and experiences in other TMDL implementation plans. Total Phase 1 (years 1-5) implementation cost for the three creeks is estimated to be \$362,700. An additional \$10,000 Phase 2 (years 6-7) implementation cost could be considered in order to fully implement the TMDL load allocation reductions.

**Table ES.1 BMPs needed for Greenvale, Paynes and Beach Creeks**

<b>Agricultural BMPs</b>		
<b>#</b>	<b>Units</b>	<b>Practice</b>
2	System	Small Acreage Grazing System (SL-6AT)
25	Acres Treated	Vegetated Buffers on Cropland (WQ-11)
<b>Residential BMPs</b>		
<b>#</b>	<b>Units</b>	<b>Practice</b>
224	System	Septic Tank Pump Out (RB-1)
23	System	Septic System Repair (RB-3)
8	System	Septic System Installation/Replacement (RB-4)
4	System	Septic System Installation/Replacement with Pump (RB-4P)
4	System	Alternative Waste Treatment System (RB-5)
46	Acres Treated	Vegetated Buffers on Residential Land
75	System	Pet Waste Composter
<b>Education Programs</b>		
<b>#</b>	<b>Units</b>	<b>Practice</b>
1	Program	Boater Education Program
3	Program	Residential Education Program
1	Program	Watermen Education Program
<b>Other BMPs</b>		
<b>#</b>	<b>Units</b>	<b>Practice</b>
3	System	Public Pet Waste Collection Facility/Signage/Supplies

The primary benefit of this implementation plan is reduced bacterial contamination in Greenvale, Paynes and Beach Creeks. Specifically, fecal contamination may be reduced to meet water quality standards and allow for the harvest of shellfish from at least part of the creeks. All of these creeks already meet the state water quality standards for safe swimming. However, further reducing fecal contamination levels in these creeks, particularly from human sources will improve public health by reducing the risk of infection from fecal sources through contact with surface waters.



## INTRODUCTION

### Background

Greenvale, Paynes and Beach Creek are located within Lancaster County on Virginia's Northern Neck. These watersheds drain south to the Rappahannock River and are subject to the ebb and flow of the tide through restricted inlets. Forests and agriculture dominate the land use with only a small percentage of the land having been developed for residential use. The branching creeks are popular to those who enjoy crabbing, fishing, wildlife watching, boating and oyster gardening. The health of these waters and the habitat they support is closely linked to the enjoyment of those who choose to live and visit these creeks.



The Clean Water Act (CWA) that became law in 1972 requires that all U.S. streams, rivers, and lakes meet their state's water quality standards. The CWA also requires that states conduct monitoring to identify polluted waters or those that do not meet standards, including narrative or numeric, chemical, physical, or biological criteria. Through this required program, the state of Virginia has found that many streams do not meet state water quality standards for protection of the five beneficial uses: fishing, swimming,

shellfish, aquatic life, and drinking. Virginia submits a list on the health of all its waters to Congress every two years. No water body can be removed from the list until:

- Its problems are solved and standards are achieved or
- The designated uses not being achieved are removed after a detailed analysis clearly shows that they cannot be obtained.

When water bodies fail to meet standards, Section 303(d) of the CWA and the U.S. Environmental Protection Agency's (EPA) Water Quality Management and Planning Regulation both require that states develop a Total Maximum Daily Load (TMDL) for each pollutant. A TMDL is a "pollution budget" for a water body. That is, it sets limits on the amount of pollution that a water body can tolerate and still maintain water quality standards. In order to develop a TMDL, background concentrations, point source and non-point source loadings are considered. A TMDL accounts for seasonal variations and must include a margin of safety. Through the TMDL process, states establish controls to reduce pollution in order to meet water quality standards.

Once a TMDL is developed, measures must be taken to reduce pollution levels in the stream. Virginia's 1997 Water Quality Monitoring, Information and Restoration Act (WQMIRA) states that the "Board [State Water Control Board, SWCB] shall develop and implement a plan to achieve fully supporting status for impaired waters". A TMDL Implementation Plan (IP) describes control measures, which can include the use of better treatment technology and the installation of best management practices (BMPs) in the watershed, to be implemented in order to meet the water quality goals established by the TMDL. CWA regulations prohibit new discharges that "will cause or contribute to the violation of water quality standards."

### **Applicable Water Quality Standards**

Water quality standards are designed to protect the public health or welfare, enhance the quality of water and serve the purposes of the State Water Control Law (§62.1-44.2 et seq. of the Code of Virginia) and the federal Clean Water Act (33 USC §1251 et seq.). Virginia Water Quality Standard 9 VAC 25-260-10 (Designation of uses.) states:

- A. *All state waters, including wetlands, are designated for the following uses: recreational uses, e.g., swimming and boating; the propagation and growth of a balanced, indigenous population of aquatic life, including game fish, which might reasonably be expected to inhabit them; wildlife; and the production of edible and marketable natural resources, e.g., fish and shellfish.*
- E. *At a minimum, uses are deemed attainable if they can be achieved by the imposition of effluent limits required under §§301(b) and 306 of the Clean Water Act and cost-effective and reasonable best management practices for nonpoint source control.*
- G. *The [State Water Quality Control] board may remove a designated use which is not an existing use, or establish subcategories of a use, if the board can demonstrate that attaining the designated use is not feasible because:*



1. *Naturally occurring pollutant concentrations prevent the attainment of the use;*
6. *Controls more stringent than those required by §§301(b) and 306 of the Clean Water Act would result in substantial and widespread economic and social impact.*

(For a complete listing of this legislative reference regarding the Designation of Uses in Virginia waters, please go to:

<http://leg1.state.va.us/cgi-bin/legp504.exe?000+reg+9VAC25-260-10>

For a shellfish supporting water body to be in compliance with Virginia's bacteria standards for the production of edible and marketable natural resource use, the Virginia Department of Environmental Quality (DEQ) specifies the following criteria (9VAC 25-260-160):

*“ In all open or estuarine waters capable of propagating shellfish or in specific areas where public or leased private shellfish beds are present, and including those waters on which condemnation or restriction classifications are established by the State Department of Health, the following criteria for fecal coliform shall apply; the geometric mean fecal coliform value for a sampling station shall not exceed an MPN (most probable number) of 14 per 100 milliliters. The 90<sup>th</sup> percentile shall not exceed 49 MPN/100 ml.”*

For those waters that do not meet the criteria, Chapter 310 of the Administrative Code describes the process by which shellfish grown in restricted (condemned) waters can enter the commercial market, a process referred to as depuration or relaying.

### **Fecal Bacteria Impairments**

Fecal coliform bacteria are the most common cause for the impairments in Virginia shellfish growing waters. This group of bacteria is considered an indicator of the presence of fecal contamination, and a common member of the fecal coliform groups is *Escherichia coli*. Fecal coliform are associated with the fecal material derived from humans and warm-blooded animals, and their presence in aquatic environments is an indication that the water may have been contaminated by pathogens or disease-producing bacteria or viruses. Waterborne pathogenic diseases include typhoid fever, viral and bacterial gastroenteritis, and hepatitis A. Pathogens are concentrated in filter-feeding shellfish and can cause disease when eaten uncooked. Therefore, the presence of elevated numbers of fecal coliform bacteria is an indicator that a potential health risk exists for individuals consuming raw shellfish. Fecal contamination can occur from point source inputs of domestic sewage or from nonpoint sources of human wastes (malfunctioning septic systems, overboard boat discharge, land application of municipal sewage sludge), and wastes from livestock, pets and wildlife.

The shellfish impairments of Greenvale, Paynes and Beach Creeks are based on restrictions placed upon the harvesting of shellfish from these waters. The two condemned areas in the watershed are condemnation number 94, Greenvale Creek and condemnation number 116, Beach Creek. Those restrictions, issued by the Virginia

Department of Health, Division of Shellfish Sanitation (VDH-DSS), are based on monthly monitoring data. VDH-DSS collects monthly fecal coliform bacteria samples from each of its sampling stations in Virginia's tidal estuaries. VDH-DSS calculates a geometric mean based on the most recent 30 months of sampling data.



This IP outlines a strategy for reducing anthropogenic loadings of bacteria to a level that complies with the TMDL. With completion of the IP, Virginia has identified a process of meeting the water quality goals for Greenvale, Paynes and Beach Creeks and a means to enhance local natural resources. Additionally, approval of the IP will enhance the opportunities for funding during implementation.

#### **STATE AND FEDERAL REQUIREMENTS FOR IMPLEMENTATION PLANS**

In developing this IP both state and federal requirements and recommendations were followed. Virginia's 1997 WQMIRA directs the State Water Control Board (SWCB) to "develop and implement a plan to achieve fully supporting status for impaired waters" (§62.1-44.19:4 through 19:8 of the Code of Virginia), in order to produce an IP that is approvable by the Commonwealth. WQMIRA establishes that the implementation plan shall include:

- the date of expected achievement of water quality objectives,
- measurable goals,

- corrective actions necessary and
- the associated costs, benefits and environmental impacts of addressing the impairments.

Section 303(d) of the CWA and current EPA regulations do not require the development of implementation strategies. The EPA does, however, outline the minimum elements of an approvable IP in its 1999 *Guidance for Water Quality-Based Decisions: The TMDL Process*. The listed elements include:

- a description of the implementation actions and management measures,
- a time line for implementing these measures,
- legal or regulatory controls,
- the time required to attain water quality standards, and
- a monitoring plan and milestones for attaining water quality standards.

It was suggested that the EPA recommendations be addressed in the IP, in addition to the required components as described by WQMIRA. In the case of Greenvale, Beach and Paynes Creeks, where there are no permitted discharges according to DEQ, it is necessary to develop pollution reductions among the various land uses contributing to the problems in the creeks and revisions to land management practices in the watershed to ensure that water quality standards can be attained.

The EPA develops guidelines that describe the process and criteria used to award CWA Section 319 nonpoint source grants to States. The guidance is subject to revision and the most recent version should be considered during IP development to improve the likelihood of funding through this source. The “Supplemental Guidelines for the Award of Section 319 Nonpoint Source Grants to States and Territories in FY 2003” identifies the following nine elements that must be included in the IP to meet the 319 requirements:

1. Identify the causes and sources or groups of similar sources that will need to be controlled to achieve the load reductions estimated in the watershed-based plan;
2. Estimate the load reductions expected to achieve water quality standards;
3. Describe the nonpoint source (NPS) pollution management measures that will need to be implemented to achieve the identified load reductions;
4. Estimate the amounts of technical and financial assistance needed, associated costs, and/or the sources and authorities that will be relied upon to implement the watershed-based plan.
5. Provide an information/education component that will be used to enhance public understanding of the project and encourage the public’s participation in selecting, designing, and implementing NPS management measures;
6. Provide a schedule for implementing the NPS management measures identified in the watershed-based plan;
7. Describe interim, measurable milestones for determining whether NPS management measures or other control actions are being implemented;
8. Identify a set of criteria for determining if loading reductions are being achieved and if progress is being made towards attaining water quality standards; if not, identify the criteria for determining if the watershed-based plan needs to be revised; and

9. Establish a monitoring component to evaluate the effectiveness of the implementation effort.

The process of incorporating these state and federal guidelines into an IP consisted of three major components:

1. Public participation
2. Implementation actions
3. Measurable goals and milestones.

Once developed, DEQ will present the IP to the SWCB for approval as the plan for implementing pollutant allocations and reductions contained in the TMDLs. DEQ will also request that the plan be included in the appropriate Water Quality Management Plan (WQMP), in accordance with the CWA's Section 303(e) and Virginia's Public Participation Guidelines for Water Quality Management Planning. As stated in the Memorandum of Understanding (MOU) between EPA and DEQ, DEQ will also submit a draft Continuous Planning Process to EPA where DEQ commits to regular updates of the WQMPs. So, the WQMP's will be the repository for all TMDLs and the TMDL IPs developed within a river basin.

## **REVIEW OF TMDL DEVELOPMENT**

Water quality monitoring data, bacteria source assessments and the allocated reductions in the TMDL study were reviewed to determine the implications of the TMDLs on IP development.

As part of the TMDL development, bacterial source tracking (BST) sampling was conducted by DEQ in Greenvale and Beach Creeks. Bacterial source tracking is intended to aid in identifying sources (i.e., human, livestock, pet and wildlife) of fecal contamination in water bodies. The study used the antibiotic resistance approach (ARA) for the analysis which utilizes the premise that bacteria from different sources have different patterns of resistance to a variety of antibiotics. Samples were collected and analyzed on a monthly basis from October 2003 through September 2004 in the two creeks. The BST results were used to estimate the percentage of the bacteria load coming from each of the source sectors; wildlife, human, livestock and pet. It should be noted that BST and ARA methods are still being developed and there are substantial limitations that should be considered when using the results. BST is not a quantitative tool and was only intended to be used to identify and estimate potential source loads to the study area.

A simplified Tidal Volumetric Model was used in the development of the TMDLs. The method used the volumes of the creeks being studied and the monitored fecal coliform concentrations to calculate the current load conditions. The creek volume and the State water quality standard were used to calculate the allowable load. The difference between the current load and the allowable load was then used to calculate the required reduction for each creek. Finally, the BST results were used to allocate loads to source sectors. The TMDLs for Greenvale and Beach Creeks are based on the 30-sample 90<sup>th</sup> percentile concentration, which was determined to represent the critical condition. The resulting loads and reductions from this analysis are shown in Table 1.



**Table 1. Loads and reductions for Greenvale and Beach Creek TMDLs**

<b>Condemnation Area</b>	<b>Current Load (MPN/day)</b>	<b>Allowable Load (MPN/day)</b>	<b>Required Reduction (%)</b>
<b>94 Greenvale Creek</b>	<b>2.21E+11</b>	<b>4.28E+10</b>	<b>81%</b>
<b>116 Beach Creek</b>	<b>2.92E+10</b>	<b>2.52E+10</b>	<b>14%</b>

The fecal bacteria TMDLs for Greenvale and Beach Creeks were developed by DEQ. The TMDL study titled *Rappahannock River: Towles Point to Deep Creek* was approved in 2006 and is available on the internet via DEQ's website at <http://www.deq.virginia.gov/tmdl/apptmdls/shellfish/lanc22.pdf>. In development of this TMDL, the 90th percentile standard of 49 MPN/100 ml was used, since it represented the more stringent condition. The TMDL assigned maximum allowable loads for the identified sources in the watersheds.

While Paynes Creek was not part of the original TMDL Study, the water body was condemned for the harvest of shellfish in 2007 due to high fecal coliform concentrations and added to the 303(d) Total Maximum Daily Load Priority List and Report in 2008. It was decided to include Paynes Creek in this IP process since it was a part of the TMDL study referenced above.

## **PUBLIC PARTICIPATION**

Collecting input from the public on restoration and outreach strategies to include in the IP was a critical step in this planning process. Since the plan will be implemented primarily by watershed stakeholders on a voluntary basis with some financial incentives, local input and support are the primary factors that will determine the success of this plan. The actions and commitments compiled in this document were developed by citizens in the watershed, Lancaster County government, Northern Neck Soil and Water Conservation District (NNSWCD), DCR, DEQ, VDH-DSS, Northern Neck Planning District Commission, Friends of Lancaster County, Tidewater Oyster Growers Association, and Northumberland Association for Progressive Stewardship. All citizens and interested parties in the watershed are encouraged to put the IP into action and contribute whatever possible to the restoration of these creeks.

### **Public Meetings for the Greenvale, Beach and Paynes Creek Watersheds**

Public meetings were held to inform the public regarding the end goals and status of the IP project as well as to provide a means for soliciting participation in the smaller, more-targeted meetings (i.e., working groups). Working groups were assembled from communities of people with common concerns regarding the TMDL process and were the primary arena for seeking public input. The working groups formed were Residential/Recreational, Business (Agriculture, Watermen, Marinas) and Government.

Representatives of DCR and DEQ attended each working group meeting in order to facilitate the process and integrate information collected from the various attendees.

The first public meeting was held at St. Mary's Whitechapel Episcopal Church in Lancaster County on April 8, 2009, from 6:00-8:00pm. The meeting was publicized in *The Virginia Register*, *The Northern Neck News* and *The Rappahannock Record*. Signs were also posted throughout the watershed notifying the public of the meeting location and time. The meeting was attended by 39 people, including 29 citizens and 10 government agency representatives. Information discussed at the meeting included a general description of the TMDL process, a more detailed description of TMDL and IP development, and a solicitation for participation in working groups. At the meeting, it was determined that three working groups would best represent the interests in the watersheds: Residential/Recreational, Business (Agriculture, Watermen and Marinas), and Government.

The final public meeting for Greenvale, Beach and Paynes Creeks was held on October 7, 2009 at the same location, and was attended by 20 people, including 15 citizens and 5 government agency representatives. The primary purpose of this meeting was to present the draft IP. A presentation was given describing the implementation plan using major components as an outline: review of TMDL development, public participation, assessment of needs, cost/benefit analysis, and implementation. A draft implementation plan and presentation was distributed to attendees. Maps with land use and VDH-DSS water quality monitoring stations were displayed.

### **Working Groups**

Working Groups were formed to deal with a number of specific implementation issues, including agricultural, residential, watermen, marinas, and government. Their representation included members from the community, government employees, and members of other organizations with specific technical knowledge.

Both the Residential/Recreational (RRWG) and Business (BWG) working groups met twice during the development of the IP. The first RRWG meeting was held on May 19, 2009, and was attended by 19 people. The first BWG meeting was held on the same date and was attended by 11 people. The groups reviewed the updated source assessment, developed BMP/corrective action scenarios and cost estimates, and developed a timeline for implementation. The RRWG discussed methods needed to reduce human and pet sources of bacteria entering Greenvale, Paynes and Beach Creeks, recommended methods to identify failing septic systems and straight pipes (as well as promoting replacement of these), and provided input regarding BMPs that would be required. The BWG reviewed agricultural concerns and solutions, the management of marina operations and their ability to address boating traffic pump out needs, and the concerns of area watermen.



The Government Working Group (GWG) met on June 23, 2009, and was attended by 13 people. The GWG addressed the resources and commitments of local, state and federal agencies that would contribute to the improved water quality of the creeks. Also discussed were existing regulatory control efforts, which may improve the quality of these creeks. A member was selected to represent the group on the Steering Committee.

The RRWG and BWG met a second time on July 28, 2009, as a combined group with 15 people attending. This meeting included the review of the Shoreline Sanitary Survey for Growing Area 22, potential action scenarios for each creek, and the selection of representatives from each working group to assist with the report to the Steering Committee. To encourage broader participation at this meeting, postcards were mailed to over 300 residents in the three watersheds, which encouraged additional phone calls, e-mails and attendees at the meeting.

The Steering Committee (SC) met on September 17, 2009, and was attended by 11 people for the review of the draft IP document. In addition to the working group representatives, the committee was made up of agency representatives. The SC also advised on the elements of the final public meeting and ensured that all recommendations of the working groups were incorporated into the plan. The SC made editorial and substantive suggestions for changes to the document at the meeting and through follow-up e-mails. As well, the SC provided comments on the PowerPoint presentation for the October 7 public meeting.

Overall, an impressive number of hours were spent by many community members and staff in the development of this plan. There was a consensus on the need for continued educational efforts for homeowners, farmers, watermen, pet owners, marina operators and boaters. There was also agreement on the need for strong partnerships between agencies and citizens who were trying for the same end goal: improve the creeks

conditions for the benefit of existing and potential residents, and those who simply visit. This IP is intended to be an example of a shellfish TMDL IP for the Northern Neck of Virginia in the hopes that it may lead to other similar efforts in areas with the potential to grow shellfish and where citizens are highly motivated to initiate clean-up efforts of impaired growing areas.

## **ASSESSMENT OF IMPLEMENTATION ACTION NEEDS**

Due to the lack of analysis in the TMDL study as to the various delivery pathways (i.e., direct versus indirect) for the source load allocations that resulted from the BST analysis, and the potential changes in the watersheds from the TMDL study up to the IP process, a reassessment of the bacteria sources in the watersheds was conducted. The analysis was based on a reassessment of the number of residences in the watersheds, quantification of human, pet, livestock and wildlife populations, an update of the shoreline sanitary survey and an estimation of agricultural applications of poultry litter and biosolids within the collective watershed. The daily fecal coliform contribution from each bacteria source was then quantified based on the population estimates, application rates and bacteria concentration values from the scientific literature. The results of the analysis suggested that wildlife was by far the dominant bacteria producer in the watershed, followed by pets, humans and livestock with about an order of magnitude separating each of the source sectors.

The TMDL study included the results of a shoreline sanitary survey that was completed in May 2001. Recognizing the importance of eliminating human sources of bacteria from these creeks, the VDH-DSS was approached and agreed to expedite updating the shoreline sanitary survey of the area. The new survey was completed in June 2009. The results of the survey can be viewed at <http://www.vdh.state.va.us/EnvironmentalHealth/shellfish/shoreline/survey022.pdf>.

Field surveys in the watershed and analysis of aerial imagery were used along with the stakeholder workgroup process, the TMDL study and the bacteria source reassessment to evaluate alternative best management practices (BMPs) and strategies to reduce the bacteria loads reaching the creeks. The various practices were discussed by the workgroups regarding the costs, effectiveness and appropriateness for the specific circumstances in the watersheds. Table 2 shows the list of practices considered for Phase 1 of this implementation plan, the cost per unit, the calculated reduction in fecal coliform derived from one unit of the practice and the calculated reduction in fecal coliform derived per dollar cost of the practice.



**Table 2. Efficiency of Phase 1 practices in reducing fecal coliform**

<b>Phase 1 Practice Efficiencies</b>				
<b>Practice</b>	<b>DSWC Practice Number</b>	<b>Per Unit Cost</b>	<b>Reduction Efficiency</b>	<b>Cost Efficiency</b>
Small Acreage Grazing System	SL-6AT	1,500	2.58E+08	1.72E+05
Vegetated Buffer on Cropland	WQ-1	400	1.69E+08	4.23E+05
Septic Tank Pump Out	RB-1	220	5.00E+06	2.27E+04
Septic System Repair	RB-3	3,000	4.13E+08	1.38E+05
Septic System Installation/Replacement	RB-4	6,000	3.75E+09	6.25E+05
Septic System Installation/Replacement with Pump	RB-4P	6,500	3.75E+09	5.77E+05
Alternative on Site Systems	RB-5	25,000	3.75E+09	1.50E+05
Recreational Boater Education Programs		5,000	7.43E+08	1.49E+05
Residential Education Programs		5,000	1.51E+10	3.02E+06
Watermen Education Programs		5,000	1.88E+10	3.76E+06
Vegetated Buffers		400	1.50E+08	3.75E+05
Residential Pet Waste Composters		100	1.90E+08	1.90E+06
Public Pet Waste Collection Facility/Signage/Supplies		700	1.50E+09	2.14E+06

The BMP and corrective action needs in the watersheds can be generally divided into four major categories; agricultural BMPs, residential BMPs, education programs and other BMPs.

### **Agricultural BMPs**

Agricultural lands in the watersheds are predominantly row crops. The fields are generally well buffered, with buffer widths exceeding the requirements of the Chesapeake Bay Preservation Act (CBPA). Several fields in the upper extent of the Greenvale Creek watershed applied biosolids in 2005. Several other fields in the Greenvale and Paynes Creek watersheds have applied poultry litter on a biennial basis since 2002. In each case, the Northern Neck Soil and Water Conservation District reports the applications have been consistent with existing nutrient management plans and other applicable best practices for application of manure based nutrients. Nonetheless, these practices import bacteria into the watershed and present the potential for non-point source bacteria contributions to the creeks. Vegetated buffers are the only BMPs identified to address bacteria sources from cropland in the watersheds.

The field surveys and stakeholder workgroups revealed no livestock in the Greenvale or Paynes Creek watersheds, and only a few residents keeping livestock in the Beach Creek watershed. BMPs to address these small pastures include small acreage grazing systems to improve pasture and manure management practices and vegetated buffers. The small

acreage grazing system BMP (SL-6AT) is a cost-shared practice in the Virginia Agricultural Cost-Share Program for TMDL Implementation areas.

**Table 3. Agricultural BMPs needed for Greenvale, Paynes and Beach Creeks**

Agricultural BMPs		
#	Units	Practice
2	System	Small Acreage Grazing System
25	Acres	Vegetated Buffer



**Residential BMPs**

Residential BMPs focus on the maintenance and repair of septic systems, identification and elimination of illegal “straight pipe” sewage discharges, the replacement of failed septic systems, and minimization of pet waste runoff from homeowner’s yards by installing pet waste composters, and vegetated buffers.

To help target the implementation of septic improvement practices, the recently completed shoreline sanitary survey identified several deficiencies, and potential pollution sources. Additionally, Lancaster County has begun a strategy to enforce the CBPA requirement for septic tank pump outs every five years. The county has mailed septic pump-out notifications to all property owners, requiring the submission of documentation to prove the residence’s septic tank has been pumped out or inspected within the past five years. As the county identifies non-compliant residences in the watersheds, they should be targeted for the appropriate implementation actions related to septic systems specified in Table 4.

**Table 4. Residential BMPs needed for Greenvale, Paynes and Beach Creeks**

<b>Residential BMPs</b>		
<b>#</b>	<b>Units</b>	<b>Practice</b>
224	System	Septic Tank Pump Out
23	System	Septic System Repair
8	System	Septic System Installation/Replacement
4	System	Septic System Installation/Replacement with Pump
4	System	Alternative Waste Treatment System
46	Acres	Vegetated Buffer
75	System	Pet Waste Composter

**Education Programs**

In addition to standard BMPs, the workgroups identified several target audiences for educational outreach efforts. The first group is recreational boaters that use the public boat ramp and marinas in Greenvale Creek along with other boaters that may enter the creek for recreational purposes. The focus of this educational effort will be to inform boaters about the availability of sanitary pump out facilities in the area and the detrimental impact overboard discharge of human waste can have on water quality. This educational effort may be in cooperation with DEQ’s efforts to have the tidal creeks of the Northern Neck designated as No-Discharge Zones. This designation would further restrict vessels from discharging wastes even after the wastes have been treated by approved marine sanitation devices. A second education program will address watermen working and residing in the creeks. This program will focus its message on proper bait and fish waste disposal and general shoreline “housekeeping” practices that can help control the wildlife concentrations in and near the creeks. Finally, there will be educational outreach efforts to residential property owners in the watersheds. The educational materials will address managing nuisance wildlife, pet waste management and proper care and maintenance of septic systems. Proper septic system maintenance includes: knowing the location of the system components and protecting them (*e.g.*, not driving or parking on top of septic tanks or drainfields, not planting trees where roots could damage the system), keeping hazardous chemicals out of the system, minimizing or eliminating the use of garbage disposals, pumping out the septic tank every five years and knowing how to identify system problems.

**Table 5. Education programs needed for Greenvale, Paynes and Beach Creeks**

<b>Education Programs</b>		
<b>#</b>	<b>Units</b>	<b>Practice</b>
1	Program	Boater Education Program
3	Program	Residential Education Program
1	Program	Watermen Education Program

## **Other BMPs**

The workgroup members and the shoreline sanitary survey identified a kennel in the Greenvale Creek watershed where up to 53 dogs are kept seasonally. To address potential pet waste generated by this concentration of animals, follow-up outreach is needed to assess waste handling methods. Control measures for confined canines will be encouraged if they are determined necessary. To further reduce the bacteria contributions from pet waste in the Greenvale Creek watershed, the workgroups proposed installing public pet waste disposal stations at the marinas and the public boat ramp to address the pet waste generated from dogs coming off of boats. These public pet waste facilities could be maintained by the property owners where such facilities are erected or by volunteers through various civic groups.

**Table 6. Other BMPs needed for Greenvale, Paynes and Beach Creeks**

<b>Other BMPs</b>		
<b>#</b>	<b>Units</b>	<b>Practice</b>
3	System	Public Pet Waste Collection Facility/Signage/Supplies

## **Phased Implementation**

Greenvale Creek is the only one of the three watersheds where it appears the implementation of the above actions may be insufficient to meet the water quality standards. In this watershed, upon completion of initial implementation (Phase 1) DEQ will re-assess the water quality to determine if the water quality standard is attained. If water quality standards are not being met, the local citizens may elect to move forward with Phase 2 implementation to address the fecal coliform contribution from wildlife through a wildlife management plan, which involves the evaluation of wildlife populations and the management of them at sustainable levels based on local citizen's objectives. A use attainability analysis (UAA) may be initiated to reflect the presence of naturally high bacteria levels due to uncontrollable sources. The outcome of the UAA may lead to the determination that the designated use(s) of the waters may need to be changed to reflect the attainable use(s).

## **COST / BENEFIT ANALYSIS**

Cost estimates of the agricultural, residential, and other BMPs in this plan were calculated by multiplying the unit cost by the number of BMP units in each watershed. The unit cost estimates for the agricultural BMPs were derived from DCR's Agricultural Cost-Share Database. Average costs for BMP installations in Lancaster County were used where sufficient data existed, otherwise, Northern Neck average costs were used. The unit costs for residential practices were developed through discussions with the local health department, the workgroups and estimates from previous TMDL IPs. Estimates for education programs are based on target audience size and experiences in other TMDL IPs. Estimated implementation costs for each BMP are listed in Table 7. Total Phase 1 implementation cost for the three creeks is estimated to be \$358,300. An additional \$10,000 Phase 2 implementation cost could be considered as an alternative to a UAA in Greenvale Creek.



The primary benefit of this implementation is cleaner waters in Greenvale, Paynes and Beach Creeks. The goal is to implement the IP so that fecal contamination may be reduced and allow for the removal of the condemnation of the shellfish growing areas. There is no commercial oyster culture or harvest in the creeks. The oysters growing in these creeks are being grown by property owners using dockside floats. It is estimated that eight property owners are currently growing oysters in the three creeks. The principal benefit to the oyster growers in these creeks would be that once the water quality is restored, they would no longer need to transport their floats to clean water to deperate the oysters prior to consumption. All of these creeks already meet the state water quality standards for safe swimming. However, further reducing fecal contamination levels in these creeks, particularly from human sources will improve public health by reducing the risk of infection from fecal sources through contact with surface waters.

The residential programs will play an important role in improving water quality, but there may also be additional return on the investment in terms of economic benefits to homeowners. An improved understanding of private on-site sewage systems (including knowledge of what steps can be taken to keep them functioning properly and the need for regular maintenance) will give homeowners the tools needed for extending the life of their systems and reducing the overall cost of ownership. The replacement of failing on-site sewage disposal systems with new septic or alternative treatment systems will have a direct and substantial impact, improving property values, and improving the local economy.



An important objective of the implementation plan is to foster continued economic vitality and strength. This objective is based on the recognition that healthy waters improve economic opportunities for Virginians, and a healthy economic base enhances the resources and funding necessary to pursue restoration and enhancement activities.

The agricultural and residential practices recommended in this document are expected to provide economic benefits, as well as environmental benefits, to the property owners in these watersheds.

**Table 7. Estimated implementation costs - Greenvale, Paynes and Beach Creeks.**

<b>Implementation Costs</b>				
<b>Units</b>	<b>Practice</b>	<b>DSWC Practice Number</b>	<b>Per Unit Cost</b>	<b>Estimated Cost</b>
2	Small Acreage Grazing System	SL-6AT	\$ 1,500	\$ 3,000
25	Vegetated Buffer on Cropland	WQ-1	\$ 400	\$ 10,000
224	Septic Tank Pump Out	RB-1	\$ 220	\$ 49,300
23	Septic System Repair	RB-3	\$ 3,000	\$ 69,000
8	Septic System Installation/Replacement	RB-4	\$ 6,000	\$ 48,000
4	Septic System Installation/Replacement with Pump	RB-4P	\$ 6,500	\$ 26,000
4	Alternative on Site Systems	RB-5	\$25,000	\$ 100,000
1	Recreational Boater Education Programs		\$ 5,000	\$ 5,000
3	Residential Education Programs		\$ 5,000	\$ 15,000
1	Watermen Education Programs		\$ 5,000	\$ 5,000
46	Vegetated Buffers		\$ 400	\$ 18,400
75	Residential Pet Waste Composters		\$ 100	\$ 7,500
3	Public Pet Waste Collection Facility/Signage/Supplies		\$ 700	\$ 2,100
<b>Phase 1 Total</b>				<b>\$ 358,300</b>
<b>Optional - Phase 2 Implementation Costs</b>				
1	Wildlife Management Program		\$10,000	\$ 10,000
<b>Optional - Phase 2 Total</b>				<b>\$ 10,000</b>
<b>Total</b>				<b>\$ 368,300</b>

**STAKEHOLDER ROLES AND RESPONSIBILITIES**

Stakeholders are individuals who live or have land management responsibilities in the watershed, including government agencies, businesses, private citizens, and special interest groups. Achieving the goals of the Greenvale, Paynes and Beach Creeks TMDL IP effort (*i.e.*, improving water quality and removing these waters from the impaired waters list) is dependent on stakeholder participation. Both the local stakeholders who are charged with the implementation of control measures and the government stakeholders who are responsible for overseeing human health and environmental programs must first acknowledge there is a water quality problem, and then make the needed changes in operations, programs, and legislation to address the pollutants.

The **EPA** has the responsibility for overseeing the various programs necessary for the success of the Clean Water Act. However, administration and enforcement of such programs falls largely to the states. In the Commonwealth of Virginia, water quality problems are dealt with through legislation, incentive programs, education, and legal actions. Currently, there are five state agencies responsible for regulating and providing educational outreach for activities that impact water quality with regard to this implementation plan. These agencies include: Department of Environmental Quality, Department of Conservation and Recreation, Department of Health, Department of Agriculture and Consumer Services (VDACS), and VA Cooperative Extension (VCE).

**DEQ** has responsibility for monitoring the waters to determine compliance with state standards, and for requiring permitted point source dischargers to maintain pollutant loads and concentrations within permit limits. They have the regulatory authority to levy fines and take legal action against those in violation of permits. While there are no permitted point source discharges in these three watersheds, there are concerns about two programs administered by DEQ. The VPA General Permit regulation for Poultry Waste Management is 9VAC25-630, and an amendment to those regulations addressing poultry litter transport and end users will soon be provided to the State Water Control Board. DEQ also deals with aspects of the Biosolids Management Program. Additionally, DEQ is responsible for presenting this IP to the SWCB for approval as the plan for implementing pollutant allocations and reductions contained in the TMDLs. DEQ also works with localities to assist in the development of No-Discharge Zones for local waters.

**DCR** manages numerous programs for addressing nonpoint sources of pollution. Historically, most DCR programs have dealt with agricultural NPS pollution through education and voluntary incentive programs. These cost-share programs were originally developed to meet the needs of voluntary partial participation and not the TMDL-required 100% participation of stakeholders. To meet the needs of the TMDL program and achieve the goals set forth in the CWA, the incentives under this program have been adjusted to account for 100% participation. It should be noted that DCR does not have regulatory authority over the majority of NPS issues addressed in this document. Their Division of Chesapeake Bay Local Assistance enforces compliance with the Chesapeake Bay Preservation Act, including septic pump out requirements and the protection of Resource Protection Areas (RPA's) and Resource Management Areas (RMA's).

Through Virginia's Agricultural Stewardship Act, the **VDACS Commissioner of Agriculture** has the authority to investigate claims that an agricultural producer is causing a water quality problem on a case-by-case basis. If deemed a problem, the Commissioner can order the producer to submit an agricultural stewardship plan to the local soil and water conservation district. If a producer fails to implement the plan, corrective action can be taken which can include a civil penalty up to \$5,000 per day. The Commissioner of Agriculture can issue an emergency corrective action if runoff is likely to endanger public health, animals, fish and aquatic life, public water supply, etc. An emergency order can shut down all or part of an agricultural activity and require specific stewardship measures. The enforcement of the Agricultural Stewardship Act is entirely complaint-driven.

**VDH** is responsible for maintaining safe drinking water measured by standards set by EPA. Their duties also include On-Site Sewage Disposal regulation. Like VDACS, VDH's program is complaint-driven. Complaints can range from a vent pipe odor that is not an actual sewage violation and takes very little time to investigate, to a large discharge violation from a failed septic system that may take many weeks or longer to achieve compliance. VDH has the responsibility of enforcing actions to correct or eliminate failed septic systems and straight pipes (Sewage Handling and Disposal Regulations, 12 VAC 5-610-10 *et seq.*) Their Division of Shellfish and Sanitation (DSS) is responsible for protecting the health of the consumers of shellfish and by ensuring that growing waters are properly classified for harvesting. DSS monitors water quality in shellfish growing areas, provide shellfish closings and sanitary surveys to identify deficiencies along the shoreline. They also administer the Marina Program to address the proper operation of pump out facilities and boater education.

**VCE** is an educational outreach program of Virginia's land grant universities (Virginia Tech and Virginia State University), and a part of the national Cooperative State Research, Education and Extension Service, an agency of the United States Department of Agriculture. VCE is a product of cooperation among local, state and federal governments in partnership with local citizens. VCE offers educational outreach and technical resources on topics such as crops, grains, livestock, dairy, natural resources and environmental management. VCE has several publications related to TMDLs and is promoting water quality education and outreach methods to citizens, businesses and developers regarding necessary pet waste reductions. For more information on publications and county extension offices, visit [www.ext.vt.edu](http://www.ext.vt.edu).

The **Northern Neck SWCD** works with many agricultural producers in the region to improve agricultural practices and minimize impacts to the area waterways. In this heavily cropped and forested region, they play an integral role in developing and implementing natural resource protection strategies. In addition to the farming community, they work with citizens on erosion and sediment related compliance concerns and encourage innovative techniques for dealing with stormwater. Their rain barrel workshops are very popular with homeowners, and their diverse partnerships add to their ability to convey a variety of water quality related education programs across the region.

State government has the authority to establish state laws that control delivery of pollutants to local waters. Local governments, in conjunction with the state, can develop ordinances involving pollution prevention measures. **Lancaster County** adopted their Chesapeake Bay Preservation Ordinance in 1991 (revised June 2005), which includes the Septic System Pump Out and Inspection program and eleven other criteria from the Chesapeake Bay Preservation Act. Lancaster County has already notified all county residents, including waterfront and non-waterfront property owners, of the septic system pump-out requirements. The county is committed to pet owner education, possibly through dog licensing or other regular mailings to landowners, but would need assistance through other area groups like the NNSWCD for the content of materials. They also agreed to include water quality educational information in tax bills so that citizens are aware of specific problems around them. The county will be a key partner with other



stakeholders in seeking grant funds to repair/replace failing on-site sewage disposal systems and to fund the various educational programs proposed in the IP.

The **Friends of Lancaster County** work to encourage public involvement in the county's planning and development process and environmental activities and advocate for the protection of Lancaster's rural character and waterways.

The **Tidewater Oyster Growers Association (TOGA)** provides “oyster gardening” training for waterfront homeowners because of the benefits for water quality and the satisfaction of growing their own oyster crop. Other grassroots groups may form specifically around the protection and restoration of these three watersheds and others in the county. For further information on TOGA, visit [www.oystergardener.org](http://www.oystergardener.org).

The **Friends of the Rappahannock (FOR)** is a non-profit river advocacy group dedicated to the protection of the Rappahannock River and her tributaries. They have offices in Fredericksburg and the Northern Neck, offering a variety of workshops and technical resources related to water quality concerns for developers, citizens and local planners. They also offer assistance to local governments on making their local ordinances more protective of water quality. They recently received grant funds to conduct workshops for homeowners in Lancaster County on various topics of water conservation and water quality. This program and other initiatives of FOR may further support the educational programming needs identified in this document. For further information on FOR, visit [www.riverfriends.org](http://www.riverfriends.org).

**Table 8. Implementation Responsibilities - Greenvale, Paynes and Beach Creeks.**

<b>Phase 1 Implementation Responsibilities</b>			
<b>Practice</b>	<b>Implementation Responsibility</b>	<b>Oversight Responsibility</b>	<b>Potential Funding</b>
Small Acreage Grazing System	Landowner/SWCD	SWCD	Cost-Share
Vegetated Buffer on Cropland	Landowner/SWCD	SWCD/County	Cost-Share
Septic Tank Pump Out	Landowner	County/VDH	Private/Grant
Septic System Repair	Landowner	County/VDH	Private/Grant
Septic System Installation/Replacement	Landowner	County/VDH	Private/Grant
Septic System Installation/Replacement with Pump	Landowner	County/VDH	Private/Grant
Alternative on Site Systems	Landowner	County/VDH	Private/Grant
Recreational Boater Education Programs	DEQ/VDH Local Citizen Groups	None	Grant
Residential Education Programs	Local Citizen Groups County/SWCD	None	Grant
Watermen Education Programs	DEQ/VDH Local Citizen Group	None	Grant
Vegetated Buffers (Residential)	Landowner	County (CBPA)	Grant
Residential Pet Waste Composters	Landowner	None	Grant
Public Pet Waste Collection Facility/Signage/Supplies	County/Marina Owners Local Citizen Groups	None	Grant

Successful implementation depends on stakeholders taking responsibility for their role in the process. While the primary role falls on the landowner, the local, state and federal agencies also have a stake in seeing that Virginia's waters are clean and provide a healthy environment for its citizens. While it is unreasonable to expect that the natural environment (*e.g.*, streams and rivers) can be made 100% free of risk to human health, it is possible and desirable to minimize pollution related to humans. Virginia's approach to correcting NPS pollution problems has been, and continues to be, primarily encouragement of participation through education and financial incentives. However, this IP identified several regulatory controls (*i.e.*, Sewage Handling and Disposal Regulations, Chesapeake Bay Preservation Act and Agricultural Stewardship Act) that could foster implementation actions.

## **MEASURABLE GOALS AND MILESTONES FOR ATTAINING WATER QUALITY STANDARDS**

### **Timeline and Milestones**

The goals of implementation are restored water quality in Greenvale, Paynes and Beach Creeks, the removal of the shellfish growing areas from Virginia's Section 303(d) impaired waters list, and the lifting of the shellfish condemnations on the creeks. Progress toward the end goals will be assessed during implementation through tracking of BMP installations and continued water quality monitoring. Phase 1 implementation on these creeks is estimated to take five years. The septic BMPs identified in the implementation plan, including repairs, replacements and pump outs, will be continuous over a five year maintenance cycle. The five year timeframe identified for implementation may be accelerated at the discretion of the local stakeholders based on funding availability.

**Year 1** will include one residential education program focused on nuisance wildlife management and the implementation of the septic BMPs to correct the deficiencies identified in the 2009 shoreline sanitary survey and Lancaster County's CBPA septic pump out enforcement program.

**Year 2** of implementation will include one residential education program focused on pet waste management, the distribution and installation of residential pet waste composters and the expansion of vegetated buffers. Septic tank pump outs will continue to be implemented by residents identified as reaching the five year point since their last documented septic service.

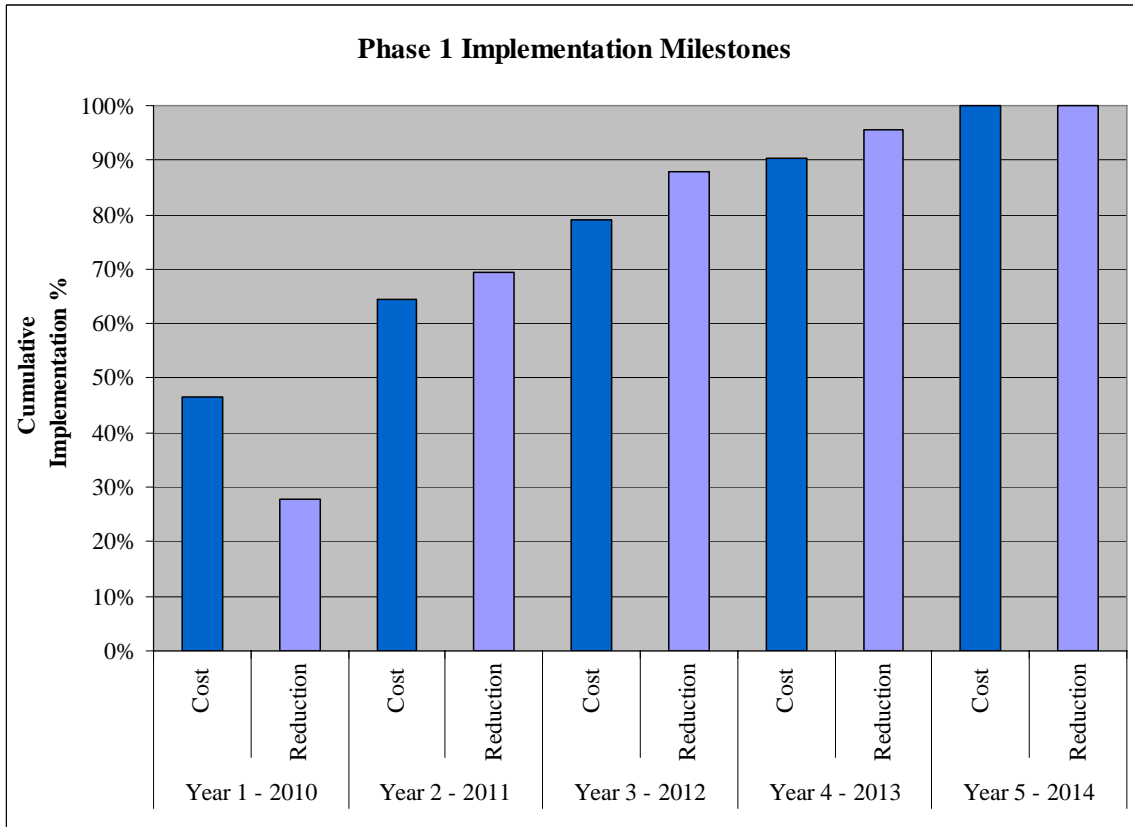
**Year 3** includes education programs for watermen and recreational boaters. BMP installation will focus on the agricultural practices identified in Table 3. Septic pump outs will continue to be implemented by residents identified as reaching the five year point since their last documented septic service.

**Year 4** of implementation will include a residential education program focused on onsite waste treatment system operations and maintenance. BMP installation will include the public pet waste collection facilities, the confined canine waste control system and additional vegetated buffers. Septic tank pump outs will continue to be implemented by

residents identified as reaching the five year point since their last documented septic service.

**Year 5** of the implementation plan provides an opportunity to complete any BMPs or education programs that were not able to be completed as scheduled. Septic tank pump outs will continue to be implemented by residents identified as reaching the 5 year point since their last documented septic service.

Upon completion of the five year Phase 1 implementation period, all of the BMPs and education programs identified in this plan should have been implemented, thereby addressing all human sources of bacteria. The calculated fecal coliform reductions associated with the types and numbers of recommended practices estimate that Paynes and Beach Creeks should have bacteria loads below the TMDL. This should put the creeks on track for delisting, assuming those reduced loads are maintained and no new bacteria sources are added. Greenvale Creek’s load could be reduced by as much as 19%, well short of the 81% reduction called for in the TMDL. Additional reductions in Greenvale Creek will likely require addressing natural sources of bacteria such as wildlife.



**Figure 1. Phase 1 implementation milestones**

Upon completion of Phase 1 implementation, water quality data will be reassessed to determine if the water quality standard is attained. If water quality standards are not being met, the local citizens may elect to move forward with Phase 2 (years 6 and 7)

implementation to address the fecal coliform contribution from wildlife through a wildlife management plan, or a UAA may be initiated to reflect the presence of naturally high bacteria levels due to uncontrollable sources. The outcomes of the UAA may lead to the determination that the designated use(s) of the waters may need to be changed to reflect the attainable use(s).

**Tracking Implementation**

Tracking of BMP implementation will serve as an interim measure of progress toward improving water quality in these creeks. Agricultural BMPs installed through the Virginia Agricultural Cost-Share Program will be tracked in the Agricultural Cost-Share Database. Repairs or replacements of on-site septic systems and straight pipes identified in the shoreline sanitary survey as discrepant will be tracked through the VDH and can be monitored on their website at [http://www.vdh.state.va.us/EnvironmentalHealth/Shellfish/documents/shoreline\\_survey.pdf](http://www.vdh.state.va.us/EnvironmentalHealth/Shellfish/documents/shoreline_survey.pdf). Lancaster County will track pump outs and associated compliance rates as part of their CBPA enforcement strategy.

**Monitoring**

Improvements in water quality and implementation progress will ultimately be determined through monitoring conducted by VDH-DSS at the established bacteriological monitoring stations in accordance with its shellfish monitoring program. DEQ will continue to use data from these monitoring stations and related ambient monitoring stations to evaluate improvements in the bacterial community and the effectiveness of TMDL implementation in attainment of the general water quality standard. VDH-DSS water quality monitoring data can be accessed using the agency’s GIS Data Viewing tool which uses Google Earth at: <http://www.vdh.state.va.us/EnvironmentalHealth/Shellfish/documents/ShellfishSanitation.kml>.

**Table 9. VDH-DSS Water quality monitoring stations for Greenvale, Paynes and Beach Creeks.**

<b>Stream Name</b>	<b>Station ID</b>	<b>Frequency</b>	<b>Type of Sampling</b>
Greenvale Creek	22-12	Monthly	Fecal coliform
Greenvale Creek	22-11	Monthly	Fecal coliform
Greenvale Creek	22-10	Monthly	Fecal coliform
Rappahannock River/ Greenvale Creek	22-9	Monthly	Fecal coliform
Paynes Creek	22-6	Monthly	Fecal coliform
Rappahannock River/ Beach Creek	22-3.5	Monthly	Fecal coliform
Beach Creek	22-3.7	Monthly	Fecal coliform





**Figure 2. Greenvale Creek condemnation zones and monitoring sites**



**Figure 3. Paynes Creek condemnation zone and monitoring site**





**Figure 4. Beach Creek condemnation zone and monitoring sites**

Additional monitoring will be conducted by citizen monitors on a yearly basis in partnership with DEQ. Citizen monitors will use Coliscan Easygel to perform monthly monitoring of *Escherichia coli* (*E. coli*) bacteria. Through comparison studies performed by DEQ, Coliscan has proven to be a good screening tool in estimating *E. coli* density. In addition, Coliscan Easygel is about 1/10<sup>th</sup> the cost of typical laboratory monitoring, allowing for testing additional sample sites in a watershed to identify potential *E. coli* “hot spots”. Although fecal *Enterococcus* and fecal coliform are the correct bacteria indicators for salt or brackish water, the citizen provided Coliscan *E. coli* data may be used to gauge the success of implementation in reducing the amount of fecal bacteria entering the streams. This citizen provided data cannot be used for the purpose of delisting the streams based on observed improvements.

#### **INTEGRATION WITH OTHER WATERSHED PLANS AND PROJECTS**

Virginia watershed’s come under a variety of individual, though related, water quality programs and activities, many of which have specific geographical boundaries and goals. These include, but are not limited to, the Chesapeake Bay 2000 agreement, Tributary Nutrient Reduction Strategies, TMDLs, Roundtables, Water Quality Management Plans, Watershed Management Plans, Erosion and Sediment Control regulations, Stormwater Management Program, Source Water Assessment Program, Green Infrastructure Plans, and local comprehensive plans.

*“The signature of Lancaster County is its river vistas, farmlands, and natural heritage. Convenient neighborhoods and commercial areas are connected to reduce interaction with traffic. Development decisions are fair to everyone and consistent with promoting economic opportunity that improves communities. Visionary elected officials and business and community leaders work together to enrich and create a legacy of healthy, beautiful places where jobs are abundant and services are accessible to all citizens.”*

And so reads the mission statement for this Northern Neck county, linked so to the tidal coves, wetlands, and tidal rivers that create a network of passages through the peninsula.

Current on-going watershed projects or programs within Lancaster County to be integrated with the Greenvale, Paynes and Beach Creeks TMDL IP include:

- Lancaster County Comprehensive Plan
- Lancaster County Septic Tank Pump-Out and Inspection Regulatory Program
- Lancaster County Chesapeake Bay Preservation Ordinance
- Friends of Lancaster County Citizen Education Programs
- Northern Neck Planning District Commission (NNPDC) Septic System Pump-Out Assistance Program
- Department of Environmental Quality No-Discharge Zone Evaluation for the Northern Neck
- NNPDC Regional Water Supply Plan
- Northern Neck Soil and Water Conservation District Urban (residential) Programs Committee and Agricultural Cost Share Programs
- Northern Neck Land Conservancy Strategic Plan
- Rappahannock River Valley National Wildlife Refuge Conservation Plan?
- Friends of the Rappahannock Livable Neighborhoods Watershed Stewardship Program
- Virginia Department of Health Division of Shellfish and Sanitation Survey, 2009
- USACE Greenvale Creek Environmental Restoration Project (dredging)
- Tidewater Oyster Grower’s Association Gardener Program
- Alliance for the Chesapeake Bay, Volunteer Citizen Monitoring Program

Dredging of Greenvale Creek to a depth of between six and seven feet was completed in August 2009. The area was last dredged in 2001. The Army Corps of Engineers estimated the removal of 22,000 cubic yards of spoil material from the creek entrance. This represents a significant modification to the circulation of Greenvale Creek. While the disturbance of bottom sediments associated with the dredging activity may have short term detrimental effects, the resulting increase in the creek’s volume, potential for improved flushing, and the removal of bacteria contaminated bottom sediments should all serve to improve the water quality of the creek.

## **POTENTIAL FUNDING SOURCES**

Potential funding sources available during implementation were identified during IP development. A brief description of the programs and their requirements is provided in this chapter. Detailed descriptions can be obtained from the Northern Neck Soil and Water Conservation District (NNSWCD), Virginia Department of Conservation and Recreation (DCR), Virginia Department of Environmental Quality (DEQ), Natural Resources Conservation Service (NRCS), Virginia Cooperative Extension (VCE) and others listed below. It is recommended that participants discuss funding options with experienced personnel at these agencies so as to choose the best option.

### **Virginia Water Quality Improvement Fund**

This is a permanent, non-reverting fund established by the Commonwealth of Virginia in order to assist local stakeholders in reducing point and nonpoint nutrient and sediment loads to surface waters. Eligible recipients include local governments, SWCDs, and non-profit organizations. Grants for nonpoint sources are administered through VADCR. Most WQIF grants provide matching funds on a 50/50 cost-share basis. A Request for Proposals towards the end of 2010 is expected to cover non-point source reduction projects.

### **Virginia Agricultural Best Management Practices Cost-Share Program**

The cost-share program is funded with state funding administered through local SWCDs. Locally, the NNSWCD administer the program to encourage farmers to use BMPs on their land to better control sediment, nutrient loss, and transportation of pollutants into surface water and groundwater due to excessive surface flow, erosion, leaching, and inadequate animal waste management. Cost-share is typically 75% of the actual cost, not to exceed the various cost-share caps, but there are also some that offer 50%.

### **Virginia Agricultural Best Management Practices Tax Credit Program**

For all taxable years, any individual or corporation engaged in agricultural production for market, who has in place a soil conservation plan approved by the local SWCD, shall be allowed a credit against the tax imposed by Section 58.1-320 of an amount equaling 25% of the first \$70,000 expended for agricultural best management practices by the individual. Any practice approved by the local SWCD Board shall be completed within the taxable year in which the credit is claimed. If the amount of the credit exceeds the taxpayer's liability for such a taxable year, the excess may be carried over for credit against income taxes in the next five taxable years. The credit shall be allowed only for expenditures made by the taxpayer from funds of his/her own sources. This program can be used independently or in conjunction with other cost-share programs on the stakeholder's portion of BMP costs.

### **Virginia Small Business Environmental Assistance Fund Loan Program**

The Fund, administered through VADEQ, is used to make loans or to guarantee loans to small businesses for the purchase and installation of environmental pollution control

equipment, equipment to implement voluntary pollution prevention measures, or equipment and structures to implement agricultural BMPs. The equipment must be needed by the small business to comply with the federal Clean Air Act, or it will allow the small business to implement voluntary pollution prevention measures. The loans are available in amounts up to \$50,000 and will carry an interest rate of 3%, with favorable repayment terms based on the borrower's ability to repay and the useful life of the equipment being purchased or the life of the BMP being implemented. There is a \$30 non-refundable application processing fee. The Fund will not be used to make loans to small businesses for the purchase and installation of equipment needed to comply with an enforcement action. To be eligible for assistance, a business must employ 100 or fewer people and be classified as a small business under the federal Small Business Act.

### **Community Development Block Grant Program**

The Department of Housing and Urban Development sponsors this program, intended to develop viable communities by providing decent housing and a suitable living environment and by expanding economic opportunities primarily for persons of low and moderate income. Recipients may initiate activities directed toward neighborhood revitalization, economic development, and provision of improved community facilities and services. Specific activities may include public services, acquisition of real property, relocation and demolition, rehabilitation of structures, and provision of public facilities and improvements, such as new or improved water and sewer facilities.

### **Conservation Reserve Program (CRP)**

Offers are accepted and processed during fixed signup periods that are announced by the Farm Services Agency (FSA). All eligible (cropland) offers are ranked using a national ranking process. If accepted, contracts are developed for a minimum of 10 and not more than 15 years. Payments are based on a per-acre soil rental rate. Cost-share assistance is available to establish the conservation cover of tree or herbaceous vegetation. The per-acre rental rate may not exceed the Commodity Credit Corporation's maximum payment amount, but producers may elect to receive an amount less than the maximum payment rate, which can increase the ranking score. Application evaluation points can be increased if certain tree species, spacing, and seeding mixtures that maximize wildlife habitats are selected. Land must have been owned or operated by the applicant for at least 12 months prior to the close of the signup period. The payment to the participant is up to 50% of the cost for establishing ground cover. Incentive payments for wetlands hydrology restoration equal 25% of the cost of restoration.

### **Wildlife Habitat Incentives Program (WHIP)**

WHIP is a voluntary program for landowners and land users who want to develop or improve wildlife habitat on private agriculture-related lands. Participants work with NRCS to prepare a wildlife habitat development plan. This plan describes the landowner's goals for improving wildlife habitat and includes a list of practices and a schedule for installation. A 10-year contract provides cost-share and technical assistance to carry out the plan. In Virginia, these plans will be prepared to address one or more of the following high priority habitat needs: early grassland habitats that are home to game

species such as quail and rabbit as well as other non-game species like meadowlark and sparrows; riparian zones along streams and rivers that provide benefits to aquatic life and terrestrial species; migration corridors which provide nesting and cover habitats for migrating songbirds, waterfowl and shorebird species; and decreasing natural habitat systems which are environmentally sensitive and have been impacted and reduced through human activities. Cost-share assistance of up to 75% of the total cost of installation (not to exceed \$10,000 per applicant) is available for establishing habitat. Applicants will be competitively ranked within the state and certain areas and practices will receive higher ranking based on their value to wildlife. Types of practices include: disking, prescribed burning, mowing, planting habitat, converting fescue to warm season grasses, establishing riparian buffers, creating habitat for waterfowl, and installing filter strips, field borders and hedgerows. For cost-share assistance, USDA pays up to 75% of the cost of installing wildlife practices.

### **Wetland Reserve Program (WRP)**

This program is a voluntary program to restore and protect wetlands on private property. The program benefits include providing fish and wildlife habitat, improving water quality, reducing flooding, recharging groundwater, protecting and improving biological diversity, and furnishing recreational and esthetic benefits. Sign-up is on a continuous basis. Landowners who choose to participate in WRP may receive payments for a conservation easement or cost-share assistance for a wetland restoration agreement. The landowner will retain ownership but voluntarily limits future use of the land. The program offers landowners three options: permanent easements, 30-year easements, and restoration cost-share agreements of a minimum 10-year duration. Under the permanent easement option, landowners may receive the agricultural value of the land up to a maximum cap and 100% of the cost of restoring the land. For the 30-year option, a landowner will receive 75% of the easement value and 75% cost-share on the restoration. A ten-year agreement is also available that pays 75% of the restoration cost. To be eligible for WRP, land must be suitable for restoration (formerly wetland and drained) or connect to adjacent wetlands. A landowner continues to control access to the land and may lease the land for hunting, fishing, or other undeveloped recreational activities. At any time, a landowner may request that additional activities be added as compatible uses. Land eligibility is dependent on length of ownership, whether the site has been degraded as a result of agriculture, and the land's ability to be restored. Restoration agreement participants must show proof of ownership. Easement participants must have owned the land for at least one year and be able to provide clear title.

### **National Fish and Wildlife Foundation**

Offers are accepted throughout the year and processed during fixed signup periods. The signup periods are on a year-round, revolving basis, and there are two decision cycles per year. Each cycle consists of a pre-proposal evaluation, a full proposal evaluation, and a Board of Directors' decision. An approved pre-proposal is a pre-requisite to the submittal of the full proposal. Grants generally range between \$10,000 and \$150,000. Projects are funded in the U.S. and any international areas that host migratory wildlife from the U.S. Grants are awarded for the purpose of conserving fish, wildlife, plants, and



their habitats. Special grant programs are listed and described on the NFWF website (<http://www.nfwf.org>). If the project does not fall into the criteria of any special grant programs, the proposal may be submitted as a general grant if it falls under the following guidelines: 1) it promotes fish, wildlife and habitat conservation, 2) it involves other conservation and community interests, 3) it leverages available funding, and 4) project outcomes are evaluated.

### **River Counties Community Foundation**

The Foundation will normally make grants from discretionary funds to support new or specific ongoing projects or programs in the areas of cultural, scientific, medical, environmental, social welfare and educational endeavors within Lancaster, Middlesex and Northumberland counties. However, grants will not normally be made to individuals, endowments or tax-supported institutions. The Board of Directors may grant exceptions on a case-by-case basis. Grants are made to eligible non-profit organizations that are exempt from federal taxation under 501 (c)(3) of the Internal Revenue Code. Generally, grants will range from \$1,000 to \$5,000. Grants will be made for operating expenses of a project including equipment, and will not be made for physical plant, day-to-day operating needs of the organization, and programs involving religious instruction/activity. The Foundation will strongly consider challenge grants or matching grants that encourage financial support from individuals and/or other charitable organizations in the project or program.

### **Northern Neck Planning District Commission**

Since 2006, the NNPDC has administered several grants through VADCR to provide full financial assistance to low-to-moderate income households in order for them to comply with septic pump-out requirements of the Chesapeake Bay Act. Proof of income is required to establish LMI qualification. In addition to the application, a copy of the first page of the applicant's tax return (Form 1040, 1040A, or 1040EZ), or a copy of Social Security benefits received by applicant. Income for each member living in the household must be included. Proof of ownership of the property where the septic tank is located must be provided (with a property tax receipt, for example). If the property is not owned by the applicant, then a copy of the lease agreement, or a statement indicating that the applicant is responsible for all maintenance of the property. Applications are taken on a first-come, first-served basis until the available grant funding earmarked for pump-outs is spent. An application form and full instructions can be found on the NNPDC website.

The **Friends of the Rappahannock (FOR)**, a non-profit river advocacy group with offices in Fredericksburg and the Northern Neck, recently were awarded a grant to conduct their Livable Neighborhood Water Stewardship education program in Lancaster County. This will contribute to much needed resources for a number of the educational programs referenced in this document.

## LIST OF ACRONYMS

ARA	Antibiotic Resistance Analysis
BMPs	Best Management Practices
BST	Bacterial Source Tracking
BWG	Business Working Group
CBPA	Chesapeake Bay Preservation Act
CREP	USDA Conservation Reserve Enhancement Program
CRP	USDA Conservation Reserve Program
CWA	Clean Water Act
DCR	Virginia Department of Conservation and Recreation
DEQ	Virginia Department of Environmental Quality
VDH -DSS	Virginia Department of Health, Division of Shellfish and Sanitation
<i>E. coli</i>	Escherichia coli bacteria
EPA	U.S. Environmental Protection Agency
EQIP	USDA Environmental Quality Incentives Program
GWG	Government Working Group
IP	TMDL Implementation Plan
MOU	Memorandum of Understanding
MPN	Most Probable Number
NNPDC	Northern Neck Planning District Commission
NNSWCD	Northern Neck Soil and Water Conservation District
NPS	Nonpoint Source Pollution
RB-1	Septic Tank Pump Out
RB-3	Septic System Repair
RB-4	Septic System Installation/Replacement
RB-4P	Septic System Installation/Replacement with Pump
RB-5	Alternative Waste Treatment System
RRWG	Residential/Recreational Working Group
SC	Steering Committee
SL-6AT	Small Acreage Grazing System
SWCB	State Water Control Board
TMDL	Total Maximum Daily Load
UAA	Use Attainability Analysis
VDACS	Virginia Department of Agriculture and Consumer Services
VDH	Virginia Department of Health
WHIP	USDA Wildlife Habitat Incentives Program
WQ-11	Vegetated Buffers on Cropland
WQMIRA	Virginia's 1997 Water Quality Monitoring, Information and Restoration Act
WQMP	Water Quality Management Plan
WRP	USDA Wetland Reserve Program

## CONTACT INFORMATION

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P.O. Box 517  
Warsaw, VA 22572  
804-333-3525  
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Northern Neck Planning District Commission  
457 Main St.  
P.O. Box 1600  
Warsaw, VA 22572  
804-333-1900  
[www.nnpdc.org](http://www.nnpdc.org)

Northern Neck Soil and Water Conservation District  
P.O. Box 220  
5559 Richmond Road  
Warsaw, VA 22572  
804-333-3525  
[www.nnswcd.org](http://www.nnswcd.org)

VA Department of Agriculture and Consumer Services  
102 Governor Street  
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VA Department of Conservation and Recreation  
P.O. Box 1425  
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VA Cooperative Extension Service  
8311 Mary Ball Rd.  
Suite 302  
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VA Department of Environmental Quality  
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VA Department of Forestry  
11260 Jessie Ball DuPont Memorial Hwy.  
Kilmarnock, VA 22482  
804-435-1831  
[www.dof.virginia.gov](http://www.dof.virginia.gov)

VA Department of Game and Inland Fisheries  
3801 John Tyler Hwy  
Charles City, VA 23060  
804-829-6580  
[www.dgif.virginia.gov](http://www.dgif.virginia.gov)

VA Department of Health (Lancaster County)  
9049 Mary Ball Rd.  
P.O. Box 158  
Lancaster, VA 22503  
804-462-5197

VA Department of Health – Division of Shellfish Sanitation  
White Stone Field Office  
482 Chesapeake Drive  
White Stone, VA 22578  
[www.vdh.state.va.us/environmentalhealth/shellfish](http://www.vdh.state.va.us/environmentalhealth/shellfish)